

Dr. Blaxall's Report to the Local Government Board
upon an Epidemic of Enteric Fever in the Village of
Selborne, Hants.

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IN consequence of the persistent presence of enteric fever in the village of Selborne, Alton Union, the Rural Sanitary Authority made application to the Local Government Board that a medical inspector might be sent down to investigate the particulars of the epidemic, and advise as to the measures necessary to be adopted to prevent the spread of the disease. Being instructed for the duty, I went to Selborne on the 5th of May. I immediately placed myself in communication with the clerk to the Sanitary Authority and the Medical Officer of Health, and during my subsequent inspection of the various parts of the village I was accompanied by the Inspector of Nuisances or the Medical Officer of Health, the latter affording me much information respecting the several cases of enteric fever that had come under his observation and treatment. Before however proceeding to enter into the particulars of the epidemic, I propose to state the result of my inquiry into the sanitary condition of the village, in order to assist in the more complete comprehension of the various conditions and circumstances which have apparently combined to favour the spread of the disease.

The parish of Selborne, the interesting features of which have been so graphically delineated by its celebrated historian Gilbert White, is purely an agricultural hop-growing district, charmingly situated in the east of Hants, not far from the borders of Surrey and Sussex, and comprising, according to the census of 1871 a population of 1,313 persons, of whom 697 reside in the village of Selborne.

The geological formation belongs to the Cretaceous system, and includes the Chalk, Upper Greensand, Gault, and Lower Greensand. The village stands upon the Upper Greensand at its junction with the Chalk Marl. The Gault is here at a depth of from 60 to 70 feet or thereabouts, but in the Priory valley on the north-east the Gault appears at the surface.

The village stands on rising ground closed in by richly-wooded hills, notably so on the south-west side, where it is separated by park lands from the beautiful hanging wood of Selborne hill. Two streams take their rise from the chalk hills at opposite extremities of the village. The one from the north-west flowing in an easterly direction through meadows, thence under the garden belonging to Fisher's Buildings, when again appearing at the surface it passes Fisher's Buildings and is led under the highway, after which it runs southwards a short distance, following the course of the road in the vicinity of dwellings, then taking a sharp turn to the east it flows on through meadows, and so to the Priory valley, where it is joined by the other stream. This latter issues from the "Well Head" at the south of the village, and flowing in a northerly direction passes under the main road near Ketcher's Farm; resuming an open course, it runs by the side of the road in the neighbourhood of dwellings, and passing under Black Moor Road, enters the deep valley to the east of the village, and flows on to Priory vale, where, as already stated, it forms a junction with the stream from the north-west; then continuing its course, ultimately unites with the Wey, and finally enters the Thames. The village consists mainly of one long straggling street, running in a direction from south-east to north-west, where it bifurcates into Gracious Street and the Alton Road.

- Dwellings.** The cottages present a clean, comfortable appearance, and their precincts as a rule are free from accumulations of refuse, although a few instances were met with where such matters had been suffered to collect for months.
- Drainage.** The village may be said to be virtually unprovided with drainage; the only attempt at anything of the kind consists in a square-shaped rough stone sewer, laid from about the middle of the main street to the Alton Road, there terminating abruptly under ground. It receives surface-water, also slop-water from the houses in its vicinity, but has no pretensions to being watertight; thus the contents percolate away through the joints, or failing this, escape at the outlet: in either case soaking into and saturating the soil. Some of the houses are provided with short drains which discharge by the side of the road, there creating nuisance, while in respect of others the slop-water is disposed of on the garden or thrown on any convenient spot.
- Excrement removal and disposal.** The privies in general are of the most unwholesome description, discharging into pits which are usually mere excavations in the soil. A few of these pits are vaulted over, but the majority are exposed to rainfall, being either loosely covered with boards or left quite open, while at the time of my visit they mostly exhibited large accumulations of filth, the intervals of removal being very irregular and often greatly prolonged, varying, I am told, from three or four months to many years; the liquid contents meanwhile soaking away and befouling the soil. The extent to which this soakage goes on may be inferred from the fact that, on cleansing the school privy, after a lapse of eight or nine years, the contents were found to be dry, the liquid matters having leaked away.
- Water-supply.** The water-supply is mainly derived from wells, but in some instances it is obtained from rain-water tanks or from the streams.
- (1.) The wells. These vary in depth from 60 to 70 feet in the main street, to from 30 to 44 feet in Gracious Street. The deeper wells are said to pass through the Upper Greensand as far as the Gault, while the shallower wells probably terminate in the Upper Greensand, and are reported to be greatly influenced by rainfall, causing the water in them to rise to surface level. Many of the wells are in dangerous relation to foul privy-pits, the permeable nature of the rock offering facilities for the passage of excremental filth and surface impurities into the wells, a danger the more imminent in the case of the shallower wells, these being fed by drainage from the surrounding area. As instances of such contamination, I may adduce the following examples of certain wells in Gracious Street:—
- a. The well belonging to Mrs. Hall's cottage, situated near a farmyard, drainage from which has so polluted the water as to render it quite unfit for use. The same with regard to the well at Mrs. Chiverton's cottage, situated at the opposite end of Gracious Street, and also affected by drainage from a farmyard.
- b. A well belonging to two cottages, one now tenanted by J. Adams, the other vacant, but formerly occupied by Henry Matthews. The well is 44 feet deep, and is situated near a pigsty, and about 35 feet distant from a privy-pit containing, when I saw it, about 3 feet of solid filth, the liquid matters having soaked away. This well being suspected of contamination, a sample of the water was submitted to Mr. Angell, the county analyst, with the result that it was pronounced to be highly contaminated and unfit for domestic purposes. (See copy of report of analysis, Appendix No. I).
- Other examples of polluted wells will be given in a subsequent part of this Report when treating of the epidemic.
- (2.) The rain-water tanks.—Two that came under observation were exposed to pollution. Thus one belonging to two comfortably-arranged well-built cottages, recently erected by Magdalen College, is situated under ground between two catch-pits (designed to receive the slop-water) and about 12 or 14 feet distant from a privy-pit. In view of the liability of the cemented walls of the tank to become defective it is obvious its situation is fraught with danger. The other tank belongs to the village school. The water is raised by means of a pump, the connecting pipe of which passes through a catch-pit which receives the slop-water of the school-house, and is intended to be emptied by means of a drain, but this latter having become defective the slops coursed along the side of the pipe and so gained entrance to the tank.
- (3.) The streams.—At their source these may be regarded as affording a

wholesome supply, but in their course they immediately become polluted by drainage from farmyards and cottages, insomuch that the water occasionally becomes discoloured, and the poor people complain of it. It is highly important that strenuous efforts should be made to protect these streams from pollution, seeing that they afford the water-supply of many dwellings situated along their course.

EPIDEMIC OF ENTERIC FEVER.

The commencement of the epidemic may be said to date from the 12th of August 1878, when four recognised cases appeared in the lower part of Gracious Street, a low-lying part of the village subject to flooding. Two other cases quickly followed (15th and 18th August), after which no fresh *house* was invaded until the 27th of September, an interval of more than five weeks, but in the meantime a second case occurred in one of the houses first infected. The 27th of September case was succeeded by a second long interval, during which no case of fever was recorded; but on the 30th of October three cases appeared, on 1st November three cases, and on 4th November two cases, thus denoting the beginning of a *second* outbreak, distinguished, like the first, by the simultaneous character of the attacks.

Fresh cases continued to appear throughout November and three cases occurred in December, followed by a third and longer interval of about two months (27th December to 21st February) when fever again appeared, one case being recorded on 21st February, one on 26th February, seven cases in March, two in April, and one in May. In all 46 cases and three deaths, distributed amongst 24 families. The dates of attacks together with other particulars are given in a tabular statement, Appendix 2.

Mr. A. Curtis, Medical Officer of Health, who attended all the cases, informed me that many of them exhibited typical symptoms of enteric fever, namely, characteristic eruption, diarrhœa, and sometimes hæmorrhage from the bowels. There was no room for doubt as to the nature of the disease.

For the convenience of description and in order to the better understanding of the course of the epidemic, I propose to consider the 46 cases in three different groups A., B., C., each group exhibiting some distinctive feature of circumstance and condition:—

Group A. comprising seven cases in four families living close together, and using one and the same water-supply.

Group B. 16 cases in seven families using one water-supply and frequenting one privy.

Group C. the remaining cases (23 in number) distributed throughout the village, and exhibiting no community of circumstance.

(The groups are shown on the accompanying map.)

Group A. comprised the earliest cases of the epidemic, and was confined to certain dwellings situated in the lower part of Gracious Street, including a single house occupied by a family named Berry: a row of four cottages, and two cottages semi-detached: seven in all. Mr. Berry's house will demand special mention as we proceed with the inquiry; for the present, attention may be confined to the six remaining dwellings. Of these, three were simultaneously invaded by fever on the 12th of August, two cases appearing in two houses of the row, and two in one of the semi-detached cottages. On the 18th August a fourth house was attacked, while on the 15th August and 15th September second attacks occurred in two previously infected families. Hence there were seven attacks in four households. Six out of the seven beginning in one and the same week. This simultaneous outbreak pointed to some condition operating in common upon the several sufferers. On inquiry as to what this condition could be, it was found (1) that milk supply was not in common for the people attacked, and (2) that there was no common privy accommodation or drainage. But on coming to inquire as to the water supply, it appeared that all six persons ill in the one week drank water from the same source, namely, from a well on Mr. Berry's premises, and the person who subsequently fell ill also drank the same water. In fact, of five households using this water only one escaped. The sixth household got their water from a rain-water tank of their own, and they escaped.

The suspected well is situated on Mr. Berry's premises close to the back door. It is 29 feet deep, and contains about 19 feet of water; but above this level there were traces of water percolating into it. Moreover, it is said to be

greatly influenced by rainfall, causing the water at times to rise to the level of the surface. The well is in dangerous relation to the outlet of the house-drain which discharges on to the road, and to a privy-pit about 70 or 80 feet distant, situated in the garden, the surface having an incline from the pit towards the well. The privy-pit is a mere excavation in the soil about 5 feet square, and was full of solid excrement, the liquid matter having drained away. As further tending to increase the pollution of the soil and endanger the well, there is reason to believe that slop-water is occasionally thrown on the surface near the back-door; thus, having regard to the character of the well and its intimate relation to the contaminating circumstances here described, it is obvious that it is eminently exposed to the risk of pollution, and this opinion is confirmed by the result of analysis of the water made by Mr. Angell in April last, when it was found to be so highly contaminated as to render it unfit for domestic purposes. (*See appended copy of analysis No. 2.*)

The question now arises as to whether this water could have become specifically polluted about the end of July, *i.e.*, prior to the outbreak of fever on the 12th August. And here it is in evidence, with reference to the single house (Mr. Berry's), that some time in June, exact date not known, Mrs. Berry's mother came from East Grinstead on a visit to her daughter, and was either suffering at that time or was attacked within a day or two of her arrival with "diarrhœa," becoming so ill that on the 17th of June a medical man was called in to see her, and he continued in attendance until the 5th July. She is reported to have been very feverish and thirsty, the diarrhœa considerable and persistent, and her linen often much soiled. During her illness one of Mrs. Berry's children was also attacked with "diarrhœa," the evacuations in both cases being disposed of in the privy, as also occasionally the water in which the soiled linen was washed, but this was more frequently thrown either on to the garden or down the house-drain, which, as already stated, discharges on to the road in the vicinity of the well. The medical man informed me that he did not consider either of these cases to have been enteric fever. I should state, however, as bearing on the question that I have since ascertained from the medical attendant of Mrs. Berry's mother at East Grinstead that about the time she left there for Selborne enteric fever was present in the road, and he believes in the very row of houses, in which she resided. Thus, the nature and history of her case, coming from an infected locality, points to enteric fever, and suggests the question whether this might not have been one of those mild cases which, presenting no typical symptoms, escape recognition. Be this as it may, it has been shown that the bowel-discharges of the sufferer were disposed of in such a manner as to involve risk of pollution to the well, and it is further noteworthy, as offering facilities for the passage of such impurities into the well, and as sufficing to explain the deferment of any influence of those impurities on the quality of the well water that a continuance of dry weather was succeeded by rainfall on the 22nd, 23rd, 24th, and 26th July amounting to 1·68 inches, which, sinking into and saturating the soil, would ultimately find its way into the well, carrying with it such excremental and other impurities as had been collecting in the neighbouring drainage area. It becomes therefore a significant fact that within 10 or 14 days of the probable date of special well pollution, enteric fever did make its appearance, attacking simultaneously three families supplied with water from this source,—the interval between the special pollution of the well and the outbreak of fever corresponding with the usual period of incubation of enteric fever when communicated by means of drinking water.

In view of all the evidence here adduced I myself find no difficulty in adopting the conclusion that enteric fever was introduced by Mrs. Berry's mother, and that the outbreak on the 12th August and subsequent cases included in this group were due to drinking the water from Mr. Berry's well which had become specifically contaminated by the evacuations passed by the above sufferer.

Group B. was formed by other cases in the vicinity of group A. There were here two families (Hobbs and Fairminer) occupying two cottages semi-detached, and eight families residing in Fisher's Buildings, formerly the workhouse, but since apportioned into eight tenements. Of the ten families, seven were attacked with fever, the first case occurring on the

27th September in the person of a Mrs. Matthews, one of the occupants of Fisher's Buildings. At this lapse of time but little satisfactory information could be obtained respecting the movements of Mrs. Matthews prior to the date of her attack, beyond the circumstance that she was related to the Smalls, one of the infected families referred to in group A., in which two cases occurred, the last bearing date the 15th of September. Unfortunately Mrs. Matthews had left Selborne. I was therefore unable to ascertain the extent of communication obtained between herself and the infected locality; but it was in evidence that pretty free intercourse of one sort or another did take place, the Small family being reported as visiting at Fisher's Buildings, and frequenting the hop-gardens where Mrs. Matthews was also present up to the time of her illness. The neighbours further stating that for some days before she gave up she complained of headache, diarrhoea, and great lassitude, insomuch that she could hardly get about; but she "muddled" on as long as she could and at last took to her bed on the 27th of September and the common privy pit of Fisher's Buildings became the receptacle for her evacuations. Now, although the evidence is not conclusive as to Mrs. Matthews having contracted the disease through communication with the infected locality of the A. cases, the probability is she did so, and the subsequent cases of this group being referable to Mrs. Matthews (as will be presently shown), her case forms a connecting link between groups A. and B.

Mrs. Matthews' case went on until October, but no fresh case occurred until the 30th October, when the fever broke out with renewed activity; three cases being recorded on the 30th October, three on the 1st November, two on the 4th November, and so on, fresh cases occurring at intervals up to the 10th of December, making a total of 15 cases (exclusive of Mrs. Matthews) in seven families. Of these 15 cases, three occurred in the Hobbs family, in one of the semi-detached cottages, and the remaining 12 cases in six families living in Fisher's Buildings.

Here, as in group A., the simultaneous appearance of a number of cases indicated exposure to the influence of a common centre of infection. As before, milk supply and sewer air could at once be excluded, but further inquiry again tended to impugn the water supply, all the sufferers (it was ascertained) having procured their water from the well at Fisher's Buildings, including, it may be noted, the Hobbs family, who although provided with a well on their own premises preferred occasionally to have recourse to that at Fisher's Buildings, their own well being sometimes affected by droppings from the thatched roof of their house.

Besides this community of water-supply there was yet another condition common to these sufferers, to wit, the privy accommodation, six out of the seven infected families habitually frequenting the privy at Fisher's Buildings, and the seventh family, it may be presumed, occasionally doing so, seeing that Mrs. Hobbs was mother to Mrs. Matthews, and nursed her during her illness, and in this way communication was established between the two families. Thus it will be seen that *all* the infected families drank of water from the same well and frequented the same privy: on the other hand of the three families that escaped one may be dismissed from consideration, having been absent from Selborne during the fever prevalence: the second family (Fairminer) lived in the adjoining cottage to Mrs. Hobbs, but drank the water of their own well and frequented their own privy. The third family, consisting of mother and four children, lived in Fisher's Buildings, exposed to the same conditions as the other residents with regard to privy accommodation and water-supply, but escaped. This, I would observe, is only in keeping with similar experience in investigations of this kind, it being no uncommon thing to find individuals or even whole families escape, though they have to all appearance been exposed to the same influence as those who have become attacked. Hence the exemption of this family does not materially weaken the suspicion that attaches to the water-supply and the privy as being concerned in the causation of the fever. Fisher's Buildings are provided with four privies, which discharge into *one* common cesspit, about 5 or 6 feet square, loosely covered over with wood. This pit is cleared out about once only in two or three years; it contained at the time of my visit about $3\frac{1}{2}$ feet of liquid filth, slop-water being occasionally thrown into it. *Primâ facie* the liquid nature of the

contents might suggest the idea that they did not soak away; but when it is remembered that the privies are used by about 30 individuals, besides being occasionally the receptacle for slops, also that the cesspit is exposed to rainfall, it is obvious that in the absence of frequent removal, the great bulk of the fluid contents must escape by soakage.

The well is sunk to a depth of 30 feet, and is situated in the wash-house in the yard, about 80 or 90 feet distant from the foul privy pit above described and at a lower level. Further, as tending to increase the saturation of the soil in the neighbourhood of the well, the stream referred to in a former section of this Report is here led under the garden, passing between the privy-pit and the well, at a distance of about 18 feet from the former and 60 feet from the latter, though approaching after leaving the garden to within 30 feet of the well. To what extent this stream may facilitate the washing of impurities into the well is difficult to determine, but that it does exercise considerable influence may be inferred from the fact that the height of the water in the well is dependent upon the volume of water in the stream. A sample of the water from this well, on being subjected to analysis by Mr. Angell in January last, was pronounced to be so contaminated as to render it unfit for dietetic purposes. (*See copy of analysis, Appendix I. No. 3.*)

Consideration of the manner in which the well as above shown is exposed to pollution, both by reason of its situation with regard to the foul cesspit, and its position in the wash-house rendering it liable to become affected by washing-water carelessly thrown on the surface, brings us to the point of connexion between the initiatory case (Mrs. Matthews) beginning on the 27th September, and the subsequent outbreak on the 30th October. For it will be remembered that the infected evacuations of Mrs. Matthews were disposed of in the privy, thereby specifically polluting the atmosphere of the privy, and probably contributing to the pollution of the well, and in this pollution the water from the wash-house, in which the infected linen was cleansed, may also have had a share. Practically, it matters little to which of the two channels here indicated, viz., the polluted atmosphere of the privy, or the polluted water of the well, the outbreak on the 30th of October and subsequent attacks more directly owe their origin: in either case the pollution would appear referable to Mrs. Matthews' illness.

Group C.—The remaining cases, 23 in number, were distributed amongst 13 families living in different parts of the village, and extended over several months dating from 4th November to 20th May, some of them being synchronous with those already considered in group B.; but inasmuch as the sufferers did not *avowedly* share in the community of water-supply and privy accommodation, to which those cases owed their origin, they could not properly be included in that group. At this stage of the epidemic fever had invaded so many families that to attempt to trace each subsequent case to independent origin was felt to be futile, the several infected persons having become sources of infection to others through the medium of privies or wells which by their instrumentality had become specifically polluted. In this way the channels of infection had become multiplied, and though there was apparently no community of circumstance or condition to account for the origin of the 23 cases taken together, yet in most instances evidence was forthcoming of connexion with previous infected localities, while it is not improbable that some seven or eight cases may have found a common centre in the village school.

This school is situated near the Alton Road, and is usually attended by about 70 children, including some of the sufferers in groups A., B., as well as cases now under consideration. The children first attacked (from groups A., B.) continued to attend school up to the dates of their illness, when it may be presumed they had for some days previously been suffering from premonitory diarrhœa, and in this way opportunity was offered for the school-privy to become specifically contaminated, thereby constituting a danger to those subsequently frequenting it,—a danger the more to be apprehended from the circumstance that the privy discharges into a closed cesspit which had not been cleared out for eight or nine years, and at the time of my visit was stinking abominably. Now, although I am not in a position to assert that this privy was actually concerned in the dissemination of the fever, it is a noteworthy fact that the schoolmistress and some seven or eight children

did contract the disease while in attendance at the school. On the other hand, it should be stated with regard to three or four of the said children, that the alternative of another channel of infection presents itself, in the fact that they lived in the vicinity of Fisher's Buildings, and were in the habit of playing about on the premises, and may have drunk of water from the polluted well there.

As another instance of an infected privy having probably been the means of spreading the disease, I would cite the following. A little girl named Wells, daughter of a blacksmith residing about the centre of the village, continued to attend school up to the 13th of November, and on the 27th of November, 14 days afterwards, the medical man was called in to see her, and he found her suffering from enteric fever, which terminated fatally on 31st December. The evacuations of this child were in part disposed of in the privy which is situated in a dark corner of the smithy, and is of the most revolting description. From this time the smithy would appear to have become an element of danger, three cases occurring associated with the blacksmith's shop: (1.) A youth named Walker taken ill on 21st February and known to frequent the blacksmith's shop; but in this case it must be stated there was also family connexion with a previous case that terminated fatally on 31st January; (2.) An apprentice attacked 26th February; he lived at the blacksmith's and worked at the forge and was thus continuously exposed to respiring an atmosphere polluted by exhalations from the infected privy; (3.) A lad attacked on 12th March, said to be in the habit of going to the blacksmith's shop. In the two latter instances no other sources of infection could be traced.

With regard to the lengthened period that elapsed between the death of the little girl Wells and the occurrence of the above cases, I would observe that it seems to me impossible—a privy once specifically infected—to estimate precisely when it may become capable of spreading the disease, or how long it may continue so; but the above cases are quoted as probably owing their origin to the polluted atmosphere of the blacksmith's privy.

Further it is interesting in the course of this epidemic to note the peculiar susceptibility to attack manifested in certain families, as exemplified in the case of the three brothers Matthews living in separate homes, namely, two of them in Fisher's Buildings and the third at the top of Gracious Street. The two in Fisher's Buildings have already been referred to as contributing to the fever list in group B.; with regard to the third brother in Gracious Street, his child was first attacked (27th November), and subsequently himself (27th December), the latter case terminating fatally on 31st January. It is open to doubt whether the disease was contracted by communication with the infected family at Fisher's Buildings or through the medium of a foul privy and well situated on the Gracious Street premises; for although evidence was not forthcoming to show how these could have become specifically contaminated, the well, as already mentioned in this Report, was found to be highly polluted. See page 2, example b.

Besides the cases immediately connected with the epidemic in Selborne village, I have to report that in the course of my inquiry I learned that six or seven cases had appeared in a row of cottages at Oakhanger, a hamlet of Selborne about two miles from the village. The water-supply of these cottages is derived from the Selborne stream below the point of confluence, and after it has been subjected to much pollution in its course through the village. The privy accommodation of the cottages is of the same unwholesome description as that in vogue at Selborne. So far as I could ascertain, the first case of fever appeared in December, the sufferer being a woman who frequented Selborne, but as she had left Oakhanger, I was unable to gain any information as to her antecedents. The next sufferer was a girl, who told me she had been very ill, and had had severe diarrhoea. But the medical man who attended her informed me that he did not consider it a case of fever. Early in February five cases appeared amongst children, but I could not learn the exact dates of their sickening. It seems doubtful whether these latter cases were due to drinking the polluted water of the stream, or to exposure to the influence of the polluted atmosphere of the privy frequented by the first sufferer.

Enteric
fever at
Oakhanger.

Summary.

To summarise the conclusions to be deduced from consideration of the history and particulars of the epidemic as herein set forth:—

(1.) The introduction of the “fever” into Selborne was probably due to importation from East Grinstead by Mrs. Berry’s mother.

(2.) The subsequent outbreak and spread of the disease may be regarded as the result of the foul privies and impure water-supplies having become specifically contaminated by the evacuations passed by persons suffering from enteric fever.

Having completed my inquiry into the history and particulars of the epidemic, fever still being present at Selborne and fresh cases continuing to occur, I deemed it my duty to advise the Authority as to the immediate measures required to be adopted in order to prevent the spread of the disease, and accordingly addressed a letter to them on the subject, pointing out, on the principles of the Board’s memoranda, the details of measures that ought to be forthwith taken in the district under the superintendence of the Medical Officer of Health for preventing danger from water supplies, privies, and filth heaps, and for disinfecting privies and articles that had been soiled by fever discharges.

Sanitary administration.

With regard to the action heretofore taken by the Sanitary Authority, it would appear they have not exercised the power accorded them under section 202 of the Public Health Act, 1875, of appointing a parochial committee for the parish of Selborne, but seeing the extent and population of the said parish, this step would seem desirable. The poor law medical officers have been appointed Medical Officers of Health for their respective districts, with the exception that Mr. Curtis is Medical Officer of Health for Selborne as well as for the adjoining district, and receives a salary of 26*l.* per annum. The office of Inspector of Nuisances for the whole Union is vested in Mr. Blake, at a salary of 40*l.* per annum, but he is not required to devote the whole of his time to the duties. These officers are in part paid by moneys voted by Parliament.

Throughout my inspection it was apparent that the Sanitary Authority had failed to appreciate the responsibility attaching to the efficient administration of the Public Health Act, as evidenced specially by the continuance of the unwholesome method of excrement removal, or rather of excrement retention, described in this Report, and the absence of any measures to prevent slop nuisance in the way of providing the village with proper drainage.

As to the measures adopted during the recent epidemic; these had consisted in giving effect to the recommendations of the Medical Officer of Health by closing the village school from November 13th to January 1st, supplying disinfectants for the purpose of disinfecting the evacuations of the sufferers, and providing a trained nurse to assist by her advice and services in the more serious cases,—a judicious measure which probably resulted in saving life, and of the benefit of whose services several of the poor expressed themselves to me as fully sensible. Further, by direction of the Authority, the Inspector of Nuisances submitted samples of water from certain wells for analysis, and on their being pronounced highly contaminated and unfit for use, circulars were issued requiring the people to thoroughly cleanse their wells, adding that in future all wells would be subjected to test by Condyl’s fluid which the Inspector of Nuisances would be ready to apply at any time if called upon to do so; and in the event of the result proving unsatisfactory steps would be taken to close the wells. These measures were evidently well-intentioned, but taken as a whole were not sufficiently comprehensive to meet the exigencies of the case, inasmuch as they did not attempt to deal with the primary source of all the mischief, namely, the unwholesome privies which poisoning the atmosphere and contributing to the pollution of the wells, it was of the first importance should have been *thoroughly* disinfected and cleansed. The testing of water by Condyl’s fluid is fallacious, and not to be depended upon to determine the wholesomeness or otherwise of the water; moreover, the duty of ascertaining the purity of the water properly devolves on the Medical Officer of Health, whose business it is to assist the Sanitary Authority with his advice as to the water-supply and other matters affecting public health. With regard to the contaminated wells, although condemned by the county analyst as unfit for use, no measures were

taken to close them. Lastly, with reference to my letter of recommendations addressed to the Sanitary Authority on the completion of my recent inquiry, I should state that on visiting Selborne a fortnight afterwards I found that the Medical Officer of Health had not officially been made acquainted with the purport of my communication, although I specially advised that the measures therein recommended should be carried out under his directions. Instead of which the letter it appears was handed over to the Inspector of Nuisances with the result that the only action taken, so far as I could ascertain, consisted in a man having gone *once* through the village and applied chloride of lime to the contents of the privies. Such supineness on the part of the Authority after having applied to the Local Government Board for assistance is difficult to understand, and highly to be deprecated in face of the imminent danger to public health involved in the present insanitary condition of their village, to remedy which prompt and well-directed action is called for, and would in the end prove both the wisest and most economical policy.

F. H. BLAXALL.

5th June 1879.

Recommendations.

- (1.) It is highly important that a wholesome method of excrement removal and disposal should be introduced, and the existing privy-pits abolished. I would suggest the adoption of the dry-earth principle as being well adapted to meet the requirements of the village. The Authority may usefully consult the Office Report on "Certain Means of preventing Excrement Nuisances in Towns and Villages." To insure the privies being kept in a wholesome condition they should be systematically supervised under direction of the Sanitary Authority.
 - (2.) Under section 15 of the Public Health Act, 1875, the Authority should provide for the proper sewerage of the village.
 - (3.) In view of the polluted state of many of the wells it is highly desirable that a plentiful supply of wholesome water should be provided. Possibly the streams at their origin might be utilised for this purpose. But the Authority should consult a skilled engineer on this subject as well as to the best mode of providing drainage.
Stringent measures should be adopted to protect streams from pollution. Wells so polluted as to be injurious to health should be closed under section 70 of the above Act.
 - (4.) It is desirable that under section 202 a parochial committee should be appointed for the parish of Selborne.
 - (5.) The Sanitary Authority should advise with the Medical Officer of Health on all points relating to public health. They should require the Inspector of Nuisances to devote the whole of his time to the performance of his duties, and should give to both these officers such remuneration as would place the Authority in a position to require of them an efficient discharge of the important duties attaching to their respective offices.
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APPENDIX I.

COPY OF REPORT OF ANALYSIS OF ADAM'S WELL.

PHYSICAL CHARACTERS.

Column of 30 inches.	
Colour, yellow.	Turbidity very great.
Smell, not any.	Taste, muddy.

MICROSCOPIC EXAMINATION.

Muddy sediment teeming with minute germs of animal and vegetable life, also animalculæ.

HARDNESS by CLARK'S SCALE.

Total hardness 16·1 degrees	{ Fixed 8·5 degrees.
	{ Removable by boiling 7·6 degrees.

CHEMICAL ANALYSIS.

—	Expressed in parts per hundred thousand.	Expressed in grs. per gallon.
I. Free ammonia - - - - -	0·0296	0·02072
II. Albuminoid ammonia - - - - -	0·0318	0·0226
Equal to nitrogen obtained from organic matter -	0·02618	0·01832
III. Nitrogen present as nitrates and nitrites - - -	0·839	0·5873
Total nitrogen in I., II., and III. - - - - -	0·8895	0·6226
IV. Chlorine - - - - -	6·6	4·62
Calculated as common salt - - - - -	10·87	7·5
V. Iron - - - - -	trace.	—

Dirty yellow colour. Total solids 46 grs. per gallon. On ignition darkened much ; bad odour.

REPORT.

This water is so contaminated as to be totally unfit for domestic use, and must on no account be used for drinking purposes.

29th April, 1879. Signed ARTHUR ANGELL,
Public Analyst.

ANALYSIS No. 2 (BERRY'S WELL).

PHYSICAL CHARACTERS.

Column of 30 inches.	
Colour, yellowish.	Turbidity, considerable.
Smell, not any.	Taste, not any.

MICROSCOPIC EXAMINATION.

Decaying vegetable matter. Germs of minute organisms, animal and vegetable.

HARDNESS by CLARK'S SCALE.

Total hardness 18·6 degrees	{ Fixed 6 degrees.
	{ Removable by boiling 12·6 degrees.

CHEMICAL ANALYSIS.

—	Expressed in parts per hundred thousand.	Expressed in grs. per gallon.
I. Free ammonia - - - - -	0·020	0·014
II. Albuminoid ammonia - - - - -	0·0188	0·01316
Equal to nitrogen obtained from organic matter -	0·01548	0·010836
III. Nitrogen present as nitrates and nitrites - - -	1·3826	0·96782
Total nitrogen in I., II., and III. - - - - -	1·4144	0·99008
IV. Chlorine - - - - -	2·8	1·96
Calculated as common salt - - - - -	4·6	3·22
V. Iron - - - - -	trace.	—

Total solids 30·5 grs. per gallon. On ignition darkened considerably.

REPORT.

This water contains a large quantity of saline ammonia, and is largely contaminated with nitrogenous organic matter, both oxidised and unoxidised.

The microscopic evidence is bad.

This water must be (unless it be very carefully filtered) condemned as unfit to drink.

(Signed) ARTHUR ANGELL,
Public Analyst.

29th April, 1879.

ANALYSIS No. 3 (WELL at FISHER'S BUILDINGS).

PHYSICAL CHARACTERS.

Colour, slightly yellow.
Smell, no perceptible.

Turbidity, very slight.
Taste, not any.

MICROSCOPIC EXAMINATION.

The matter which subsided consisted of animal and vegetable debris, hairs and fibres, swarming with various kinds of animalcule.

HARDNESS by CLARK'S SCALE.

Total hardness 21.1 degrees { Fixed 8.5 degrees.
Removable by boiling 12.6 degrees.

CHEMICAL ANALYSIS.

	Expressed in parts per hundred thousand.	Expressed in grs. per gallon.
I. Free ammonia - - - - -	0.0240	0.0168
II. Albuminoid ammonia - - - - -	0.0098	0.00686
Equal to nitrogen obtained from organic matter -	0.00807	0.005649
III. Nitrogen present as nitrates and nitrites - -	0.52178	0.365246
Total nitrogen in I., II., and III. - - - -	0.54961	0.384727
IV. Chlorine - - - - -	3.2	2.24
Calculated as common salt - - - - -	5.27	3.68
V. Iron - - - - -	a trace.	—

Total solids 35.17 grs. per gallon.

On ignition, darkened; bad odour. Total loss of weight 4.69 grs. per gallon.

REPORT.

The ammonia yielded by saline and by organic matters are in excess; these indicate the presence of nitrogenous or albuminoid substances in solution, and of ammoniacal salts derived from them. The nitrogen due to oxidised organic matter is also excessive, the microscopic results are bad, and the behaviour of the solid residue on ignition very suspicious.

I am of opinion, consequent upon these analytical results, that this water is not in a fit state for dietetical purposes.

(Signed) ARTHUR ANGELL,
Public Analyst.

30th January, 1879.

APPENDIX II.

TABLE.

A LIST of CASES of ENTERIC FEVER in the Village of SELBORNE from
June 1878 to 20th May 1879.

No. of Case.	Group.	Name.	Age.	Probable Date of Attack.	Water-supply.	Remarks.
1	Group A	Mrs. Tester -	Adult	June	Not known -	Mrs. Berry's mother from East Grinstead. Said to have been severe diarrhoea, but strong suspicion of enteric fever.
2	Do.	Mrs Berry's child -	Child	July ?	Berry's well -	Grandchild of the above, and likewise reported to be a case of diarrhoea.
3	Do.	J. Adams -	Adult	Aug. 12	Do.	
4	Do.	R. Small -	Child	" "	Do.	Attended village school till date of attack.
5	Do.	— Wood -	Do.	" "	Do.	Do.
6	Do.	— Wood -	Do.	" "	Do.	
7	Do.	Mrs. Adams -	Adult	" 15	Do.	Wife of case 3.
8	Do.	Mrs. Chiverton -	Do.	" 18	Do.	
9	Do.	— Small -	Do.	Sept. 15	Do.	Father of case 4.
10	Group B	Mrs. F. Matthews -	Do.	" 27	Well at Fisher's Buildings.	
11	Do.	F. Matthews -	Do.	Oct. 30	Do.	Husband of case 10.
12	Do.	— Matthews -	Child	" "	Do.	Son of above. Attended village school.
13	Do.	K. Hobbs -	Do.	" "	Do, also own well.	Sister of case 10. Attended village school.
14	Do.	T. Matthews -	Adult	Nov. 1	Well at Fisher's Buildings.	Brother of case 11.
15	Do.	G. Oakley -	Child	" "	Do.	Attended village school.
16	Do.	J. Chiverton -	Do.	" "	Do.	Do.
17	Do.	Mrs. Hobbs -	Adult	" 4	Do., also own well.	Mother of cases 10 and 13; nursed case 10.
18	Do.	A. Hobbs -	Child	" "	Do. do.	Son of above.
19	Group C	— Hewitt -	Do.	" "	Rain-water tank	Attended school; played on premises of Fisher's Buildings.
20	Do.	— Kemp -	Do.	" "	Own well	Attended school.
21	Group B	— Oakley -	Boy	" 11	Well at Fisher's Buildings.	Brother of case 15.
22	Do.	E. Chiverton -	Child	" 12	Do.	Sister of case 16. Attended school.
23	Group C	— Hewitt -	Do.	" "	Rain-water tank	Sister of case 19. Attended school, and played at Fisher's Buildings.
24	Do.	Do. -	Do.	" 13?	Do.	Brother of above.
25	Do.	Do. -	Boy	" 15?	Do.	Brother of above.
26	Do.	— Bright -	Child	" 13	Stream -	Attended school, and played at Fisher's Buildings.
27	Do.	— Best -	Adult	" "	Own well	Schoolmistress.
28	Group B	— Etherington -	Boy	" 12	Well at Fisher's Buildings.	
29	Do.	Do. -	Do.	" 20	Do.	Brother of above
30	Do.	Do. -	Do.	" 22	Do.	Do.
31	Do.	M. Hutton -	Adult	" "	Do.	
32	Group C	M. Wells -	Child	" 27	Own well	Attended school. <i>Died 30th December.</i>
33	Do.	— Matthews -	Do.	" "	Do.	Related to cases 10, 11, 12, 14, and visited at infected houses.
34	Group B	— Etherington -	Lad	" 10	Well at Fisher's Buildings.	Brother to cases 28, 30.
35	Group C	— Bright -	Boy	" 13	Stream -	Brother of case 26.
36	Do.	H. Matthews -	Adult	Dec. 27	Do.	<i>Died 31st January.</i> Father of case 33.
37	Do.	— Walker -	Lad	1879. Feb. 21	Do. -	Frequented blacksmiths' shop; brother-in-law of case 34.
38	Do.	— White -	Lad	Feb. 26	Owu well	Blacksmith's apprentice.
39	Do.	— Smith -	Girl	March 3	Stream -	Said to have visited the black smith's; attended Sunday schools.
40	Do.	— Stenning -	Lad	" 5	Do., also Berry's well.	Worked on Berry's premises. (Group A.)
41	Do.	— Wells -	Do.	" 12	Stream -	Frequented blacksmith's.
42	Do.	Do. -	Adult	" 20	Do. -	<i>Died 27th April.</i> Father of above; occasionally worked on Berry's premises.
43	Do.	Do. -	Child	" 28	Do. -	Daughter of above.
44	Do.	— Hoare -	Boy	" 24	Own well	Lived at top of Selborne Hill, and frequented village. Said to have visited blacksmith's.
45	Do.	— Stenning -	Do.	" 26	? Stream	Brother to case 40.
46	Do.	— Bicknell -	Do.	April 4	? -	Attended school, but lived out of the village.
47	Do.	— Walker -	Do.	" 23	Own well.	
48	Do.	— Stenning -	Girl	May 20	Stream -	Sister of cases 40 and 45.



Hopkita

Fishers Building

Berry's Smithy

National Schools

St. Mary's Church

SELBORNE
VILLAGE

Windmill

Blacksmiths

The Zigzag

Well head a quarter-mile further

- FEVER CASES
- GROUP A. (Orange)
 - GROUP B. (Green)
 - GROUP C. (Blue) (THREE OTHERS BEYOND THE MAP AREA.)
 - OPEN STREAM
 - COVERED STREAM NEAR FISHER'S BUILDING.

SCALE
Feet 100 500 1000

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